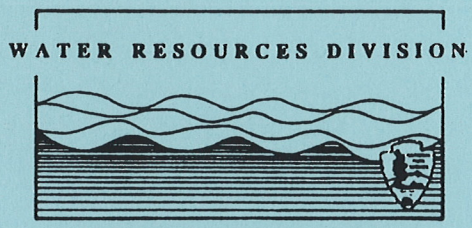
UNDERGROUND STORAGE TANK
INITIAL SITE CHARACTERIZATION
CUMBERLAND ISLAND NATIONAL SEASHORE

ST. MARYS, GEORGIA

Gary W. Rosenlieb

Technical Report NPS/NRWRD/NRTR-90/01



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October 1990

United States Department of Interior • National Park Service

Water Resources Division • 301 S. Howes Street • Fort Collins, CO 80521

EXECUTIVE SUMMARY

This document is the Initial Site Characterization (ISC) for suspected fuel leakage from underground storage tanks (USTs) at the National Park Service's (NPS) Cumberland Island National Seashore (CUIS) administrative headquarters, St. Marys, Georgia. This ISC was prepared by the NPS, Water Resources Division for sub-mission to the Georgia Department of Natural Resources (GDNR) in accordance with the Federal Underground Storage Tank Regulations. The purpose of this ISC is to report to the GDNR the nature and extent of the UST release, and what elements of the natural and human environment may be affected by the release.

This ISC concludes that the diesel and gasoline USTs at CUIS administrative headquarters leaked an unknown quantity of hydrocarbon fuels to the environment. The fuel leakage caused environmental damage to about 6 square yards of the intertidal vegetative zone of the St. Marys River. The vegetation, however, is reestablishing itself within the contaminated area. No evidence was found that any existing potable water supplies were contaminated by the fuel leakage.

The Superintendent of CUIS submitted the draft ISC to the GDNR on August 2, 1989. After reviewing the ISC, GDNR concluded that the fuel release had little or no impact on surface or ground water. In an August 23, 1989, letter to the Superintendent, the GDNR stated that no additional remedial action would be required at the site.

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INTRODUCTION

BACKGROUND

In the summer of 1988, employees of the National Park Service (NPS), Cumberland Island National Seashore (CUIS) noticed a petroleum sheen on the St. Marys River near the administrative head-quarters of the park. CUIS employees originally thought that the sheen was being produced by a sunken shrimp boat down-river from the headquarters. However, during low tide, it was noticed that a fuel-like substance was emerging from a rip-rap covered bank of the St. Marys River. According to the CUIS Superintendent, the substance had the odor of diesel fuel. Suspecting the park's 14-year old underground fuel storage tanks (USTs), located about 60 feet to the north of the fuel emergence point, the park stopped using fuel from the USTs and evacuated the remaining fuel from both 1000-gallon diesel and gasoline USTs. CUIS personnel report that the sheen disappeared in about 2 weeks.

ACTIONS TAKEN TO DATE

The CUIS Superintendent reported the suspected release of a petroleum substance to the Georgia Department of Natural Resources (GDNR) on December 8, 1988. By a letter dated February 3, 1989, the GDNR directed the park to submit an Initial Site Characterization (ISC) report in accordance with paragraph 280.63 of the Federal Underground Storage Tank Regulations, and a milestone schedule which listed a timetable leading to the submission of a Containment Action Plan (CAP). The milestone schedule was submitted by the NPS's Water Resources Division (WRD) on May 2, 1989. The CUIS's USTs were removed from the ground on May 3, 1989. In accordance with paragraph 280.66 subpart (d) of the Federal UST Regulations, CUIS personnel removed about 175 tons of diesel and gasoline contaminated soil and disposed it at the City of St. Marys landfill. During the UST and soil removal operation, from May 3 to May 5, 1989, investigations which included soil, surface water, ground water, and drinking water sampling were conducted for the purpose of preparing this ISC.

SCOPE

This report presents the data, results, and conclusions of an Initial Site Characterization study conducted at the CUIS headquarters. As per the Federal UST Regulations, paragraph 280.63, this report incorporates findings from existing literature sources and site investigations concerning surrounding populations, surface and ground water quality, potable water supplies potentially affected by the release of fuel, subsurface soil conditions and surrounding land and water uses. Since contaminated soil was removed from the CUIS UST site, this report also incorporates findings regarding the success of the clean-up effort.

LOCATION AND ENVIRONS

VICINITY

The study area is located at the CUIS headquarters and visitors center in the town of St. Marys, Camden County, Georgia (Figure 1). St. Marys is located along an intertidal section of the St. Marys River, and is more broadly associated with the sea island section of the Coastal Plain Physiographic province of Georgia (Figure 2). NPS facilities in St. Marys consist of an administration/visitor center building, a storage warehouse, and a dock located on the St. Marys waterfront. The USTs evaluated within this report were located about 30 feet to the east of the administrative/visitor center (Figure 3). These facilities serve as the administrative headquarters, as well as the demarcation point for park visitors going to Cumberland Island. Visitors leave via boat from the dock facilities administered by the NPS.

CLIMATE

The climate of the St. Marys vicinity is characterized by warm, humid summers and short mild winters. Rainfall averages about 50 inches per year with spring being the driest season. Summer temperatures generally range from about the low 70's to the low 90's (degrees F) and winter temperatures range from 40 to about 60 degrees F.

SURFACE WATER

The St. Marys River is the major surface water feature in the area. The St. Marys River originates in the Okefenokee Swamp and empties into the Cumberland Sound about 2 miles to the east of St. Marys. Tides in the St. Marys vicinity are semidiurnal and range from neap tides of about 5 feet to spring tides of over 8 feet (United States Geological Survey, 1985). One water sample collected from the St. Marys River at high tide during this investigation reveals a total dissolved solids (TDS) concentration of 35,800 milligrams per liter (mg/l). The dominate ions were sodium and chloride. The State of Georgia's designated beneficial uses for the St. Marys River are recreation and as "waters generally supporting shellfish" (State of Georgia Water Use Classifications and Water Quality Standards, undated).

GROUND WATER

At CUIS facilities, the ground-water table was observed to fluctuate with the St. Marys River tide to within 3.5 feet of the ground surface. Because the water table dropped below the maximum depths of our excavations, no determination was made of the minimum ground-water table elevation during low tide. Ground-water quality, at the time of our investigation, can be described as fresh. TDS concentrations in grab samples collected from pits during high tide ranged from 836 mg/l to 1,840 mg/l.

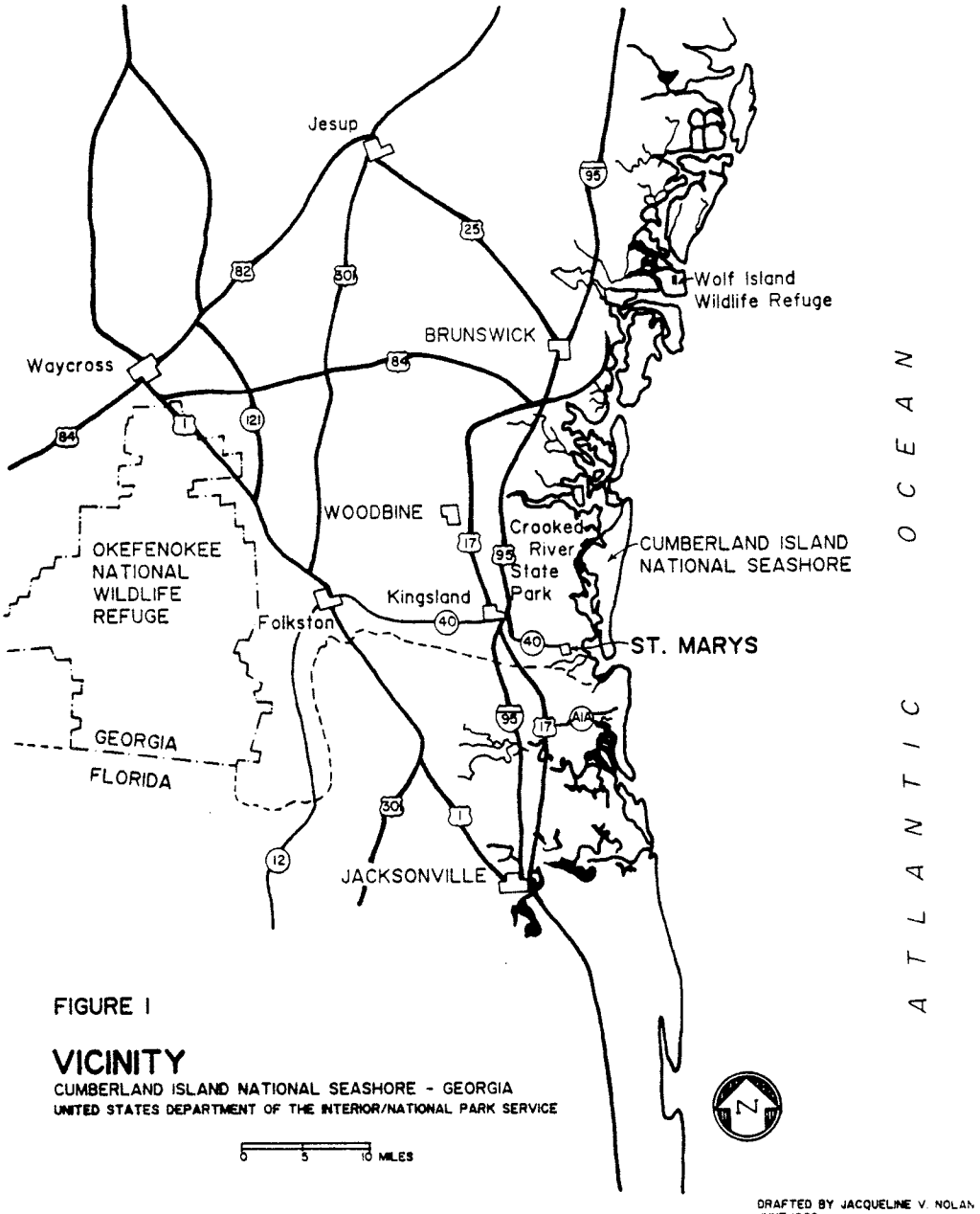

FIGURE 1

VICINITY

CUMBERLAND ISLAND NATIONAL SEASHORE - GEORGIA

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

DRAFTED BY JACQUELINE V. NOLAN
JUNE 1989
NATIONAL PARK SERVICE - WRD
WATER OPERATIONS BRANCH

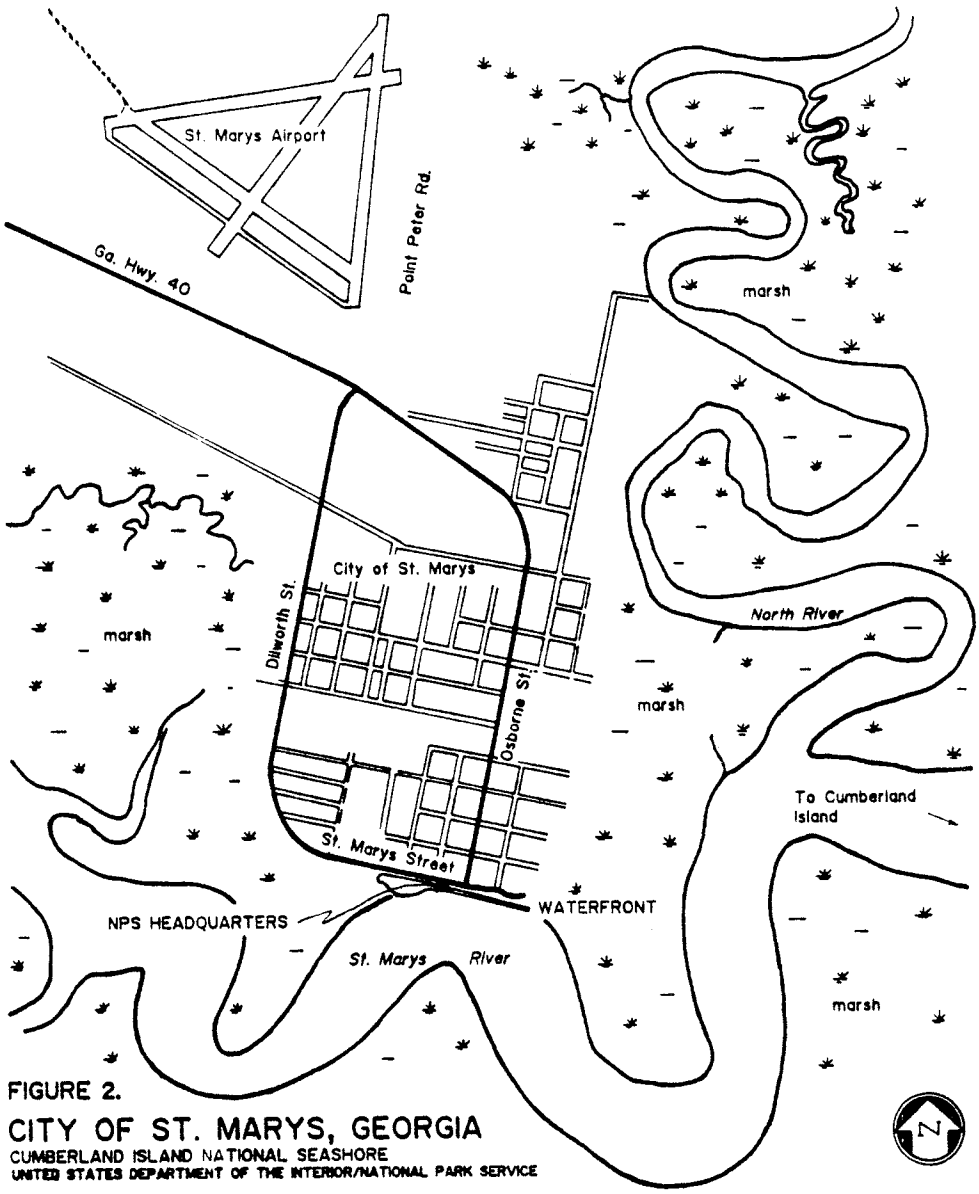

FIGURE 2.

CITY OF ST. MARYS, GEORGIA

CUMBERLAND ISLAND NATIONAL SEASHORE

UNITED STATES DEPARTMENT OF THE INTERIOR/NATIONAL PARK SERVICE

DRAFTED BY JACQUELINE V. NOLAN
JUNE 1989
NATIONAL PARK SERVICE - WRO
WATER OPERATIONS BRANCH

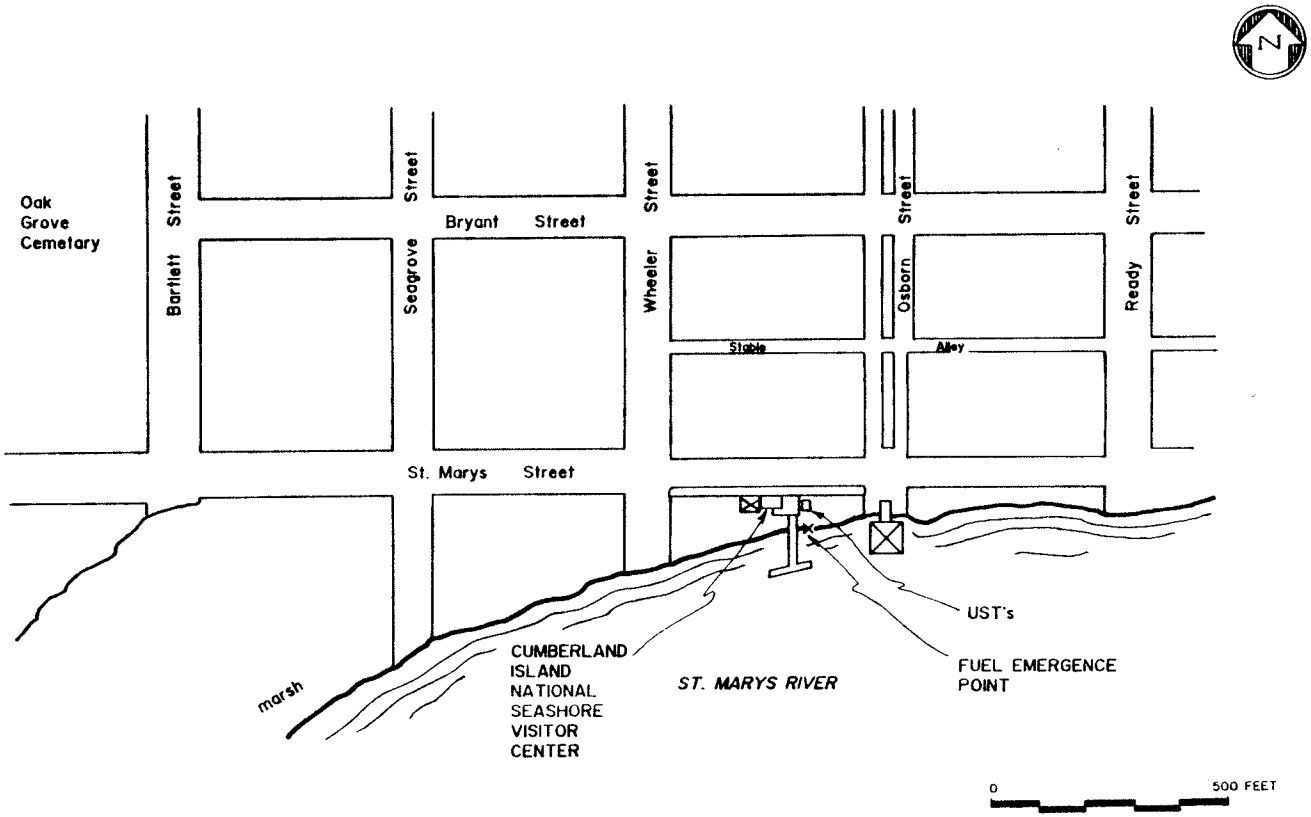

FIGURE 3.

NPS FACILITIES, UST, AND FUEL EMERGENCE POINT LOCATION
ST. MARYS, GEORGIA

DRAFTED BY JACQUELINE V. NOLAN
JUNE 1989
NATIONAL PARK SERVICE - WRO

POTABLE WATER SUPPLIES AND WATER USE

Drinking water for the CUIS facilities is obtained from the City of St. Marys municipal supplies. The city of St. Marys obtains its municipal supplies from the Coastal Plain Aquifer (Georgia Marine Science Center, 1975). The Superintendent reports that some St. Marys' residents utilize water pumped from shallow wells (15-30 feet) for lawn watering. No wells which extract water for drinking purposes were located within one block of the CUIS facilities.

SOILS

No soil maps were found for the immediate study area. However, the soils at the study area appear to be the result of fluvial processes, as well as materials deposited by man. Based on visual observations and field hand testing, soils adjacent to the USTs consisted of alternating layers of well-drained, grey, white, and brown sands and sandy loams. The soil, when compressed, formed a very fragile cast. Neither a soil thread, nor a soil ribbon could be formed. A layer of cobbles and boulders was encountered near the USTs at a depth of about 36 to 60 inches. The layer of cobbles and boulders extended from the USTs to the St. Marys River. Local residents reported that the boulder and cobbles are "ballast rocks" which were discarded by boats that historically docked near the existing CUIS facilities.

FLORA AND FAUNA

Vegetation at the study site primarily consists of salt tolerant grasses such as cordgrass (*Spartina*) and saltgrass (*Distichlis*). These grasses primarily are inhabitants of the intertidal bank area of the St. Marys River. Aquatic fauna, which was observed at the site, included oysters (*Crassostrea*) which were attached to the NPS dock facilities and fiddler crabs (*Uca*) which were observed along intertidal banks of the St. Marys River.

INVESTIGATIVE METHODS

VISUAL OBSERVATION

A site inspection was conducted prior to removing the USTs on May 2, 1989. Additional observations were made of soil profiles, tide, and ground-water fluctuations after the USTs were removed.

SOIL AND WATER SAMPLING LOCATIONS

The soil and water sampling effort was designed to collect water and soil profile samples from: (1) up-gradient of the USTs, (2) the fuel discharge point on the St Marys River bank, (3) a site down-gradient of the USTs between the USTs and the suspected fuel discharge point, (4) below the USTs (after removal), (5) paired sites about 20 feet from

emergence point, and (6) the St. Marys River and/or other surface water and ground water sources in the area. During excavation of contaminated soil, additional soil samples were collected by park personnel from the floor of the excavation. A description of each sample site is presented in Table 1 and depicted on Figure 4.

PARAMETERS

Based on conversations with Dave Muntz of the GDNR, soil samples were analyzed for Total Petroleum Hydrocarbons (TPH). All water samples were analyzed for: TPHs, toluene-benzene-ethyl benzene-xylene (TBEX) and total lead. To further characterize the quality of the ground water at the site, selected samples were analyzed for TDS, chloride, sodium, sulfate, calcium, and ph. Electrical conductivity (Ec) data were collected in the field with a Yellow Springs Institute model 33 SCT conductivity meter.

SAMPLING AND ANALYTICAL PROCEDURES

Soil profile samples were collected and consolidated by 12-inch intervals from either boreholes constructed with a hand-held bucket auger or from the sides of pits constructed by a backhoe. Soil and water samples were collected, preserved, and stored in accordance with the methodologies and sample container requirements in Appendix 1. All samples were packed in ice and shipped to Core Laboratories in Aurora, Colorado, for analyses. Core Laboratories' referenced analytical procedures for each parameter analyzed are also presented in Appendix 1.

RESULTS

SITE INSPECTION

The USTs were not completely covered with soil, and therefore the crowns of the USTs were visible before removal (Photo 1). The fuel discharge point near the St. Marys River was inspected. This point is about 6 square yards in size, noticeably grey in color, and the central most portion of the area was void of cordgrass which was residing on the surrounding bank area (Photo 2). However, cordgrass was reestablishing itself on the fringes of the affected area. Several fiddler crabs had also colonized the affected area. The affected area was submerged during high tide. While submerged, a petroleum sheen could not be observed emanating from the contaminated area.

UST REMOVAL

The diesel UST was removed first. While the UST was being elevated with the backhoe, about 150 gallons of a liquid judged to be mostly water, but mixed with diesel fuel, flowed from the UST into the excavation pit (Photo 3). When removed, visual inspection of the UST revealed several holes penetrating the entire thickness of the UST. The holes, ranging from about 0.1 to 0.5 inches in diameter, were located from end to end along the underside portion of the UST (Photo 4). The gasoline UST, upon removal, revealed similar corrosion patterns to the diesel UST. An estimated 10 to 15 gallons of

TABLE 1

Sample Site Description and Summary of Investigative Efforts
Cumberland Island National Seashore, Initial Site Characterization

SITE	DESCRIPTION	GROUND WATER SAMPLES	SURFACE WATER SAMPLES	DRINKING WATER SAMPLES	SOIL SAMPLES	ANALYTICAL *PARAMETERS
CUIS-1	Borehole constructed with a bucket auger, 15' north of USTs.	-	-	-	0"-12" 24"-36" 48"-60" 72"-84" 84"-96"	A
CUIS-2	Pit constructed by a backhoe, about 25' southeast of the USTs	-	-	-	36"-48"	A
CUIS-3	Pit constructed by a backhoe, about 35' southwest of the USTs	1	-	-	-	A,B,C
CUIS-4	Fuel emergence point on the St. Marys River bank.	-	-	-	0"-12"	A
CUIS-5	Pit constructed by backhoe about 20' south of the USTs	1	-	-	24"-36" 48"-60"	A,B
CUIS-6	UST excavation pit	1	-	-	0"-12" 12"-24" 24"-36"	A,B,C
CUIS-7	The north-most wall and floor of the excavtion pit	-	-	-	48"-60"	A

TABLE 1 (cont)

CUIS-8	The floor of the excavation about 10' south of CUIS-5	-	-	-	60"	A
CUIS-9	The floor of the excavation about 5' north of the St. Marys River bank	-	-	-	48"	A
SM-1	St. Marys River at the emergence point during high tide	-	1	-	-	B,C
DW-1	A water spigot on the west side of the boardwalk to the NPS dock; represenative of CUIS drinking water	-	-	1	-	B

Notes:

* Soil samples depths are depths below ground surface for all samples except CUIS-6, which is measured as depth below the bottom of the USTs.

Analytical Parmeters:

A= Soil Analysis - Total Petroleum Hydrocarbons
B= Water Analysis - Total Petroleum Hydrocarbons, Toluene, Benzene, Ethyl Benzene, and Xylenes
C= Water Analysis - Total Dissolved Solids, Electrical Conductivity, Sodium, Calcium, Chloride, Total Lead, and pH

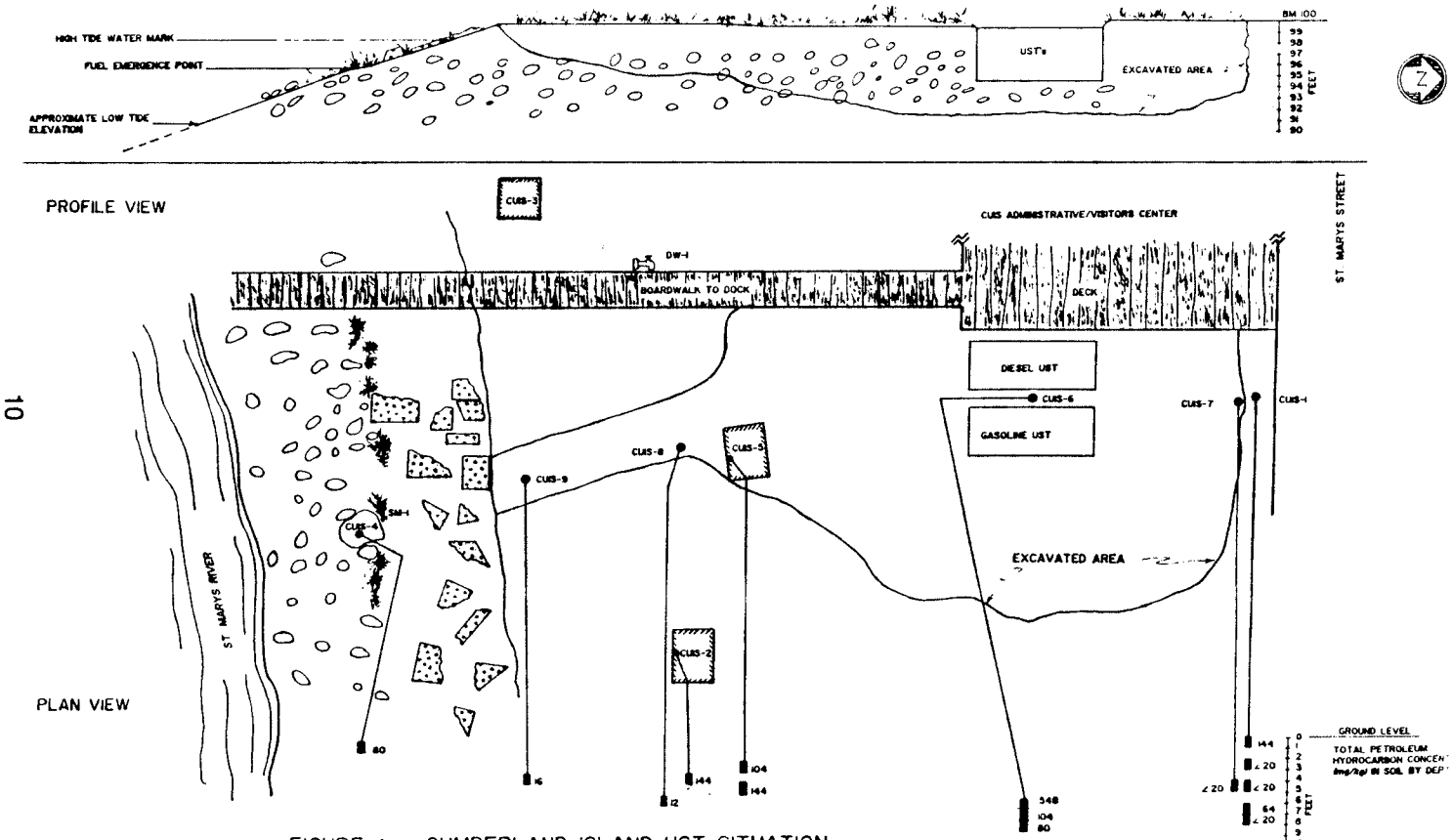

FIGURE 4. CUMBERLAND ISLAND UST SITUATION AND TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS

Photo 1. CUIS USTs before removal. May 3, 1989

Photo 2. Fuel emergence point (encircled) on the St. Marys River. Contaminated soil removal is ongoing in background. May 3, 1989

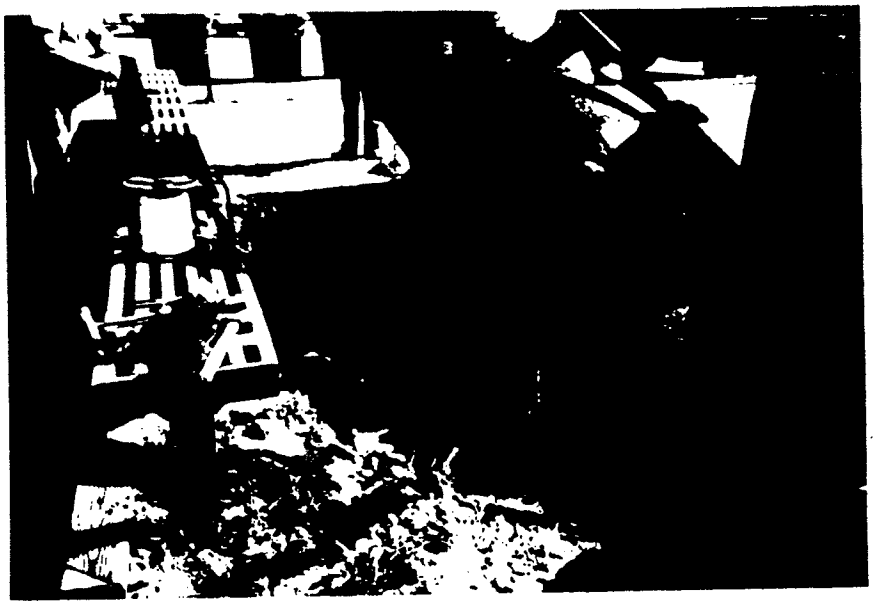

Photo 3. Water and diesel flowing from UST during removal.
May 3, 1989

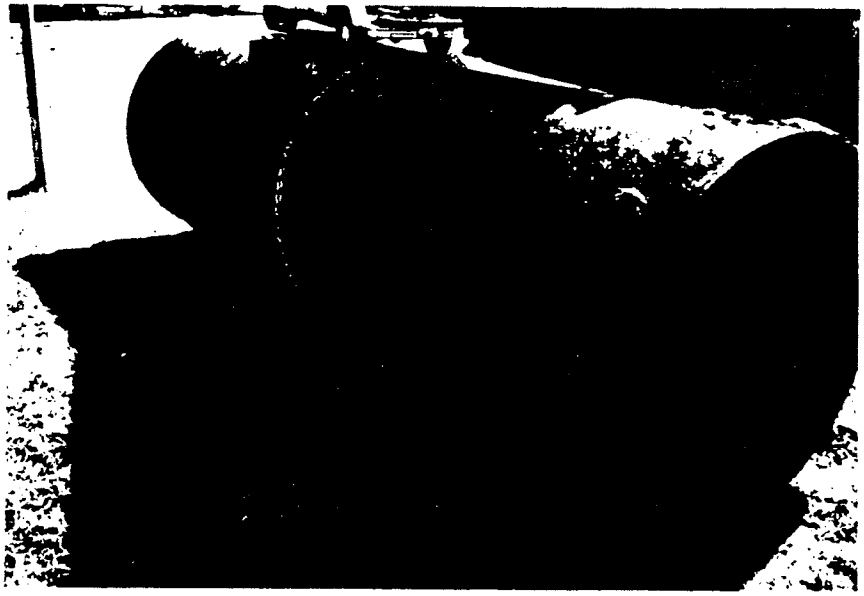

Photo 4. Diesel UST after removal. Circle indicates the location of three 0.5 inch diameter holes.
May 3, 1989

gasoline leaked from the UST into the excavation pit during removal. As much of the fluid as possible was removed from the pit by bailing and put into 55 gallons drums for temporary storage.

SOIL OBSERVATIONS

Upon removal of the USTs and further excavation of the pit, a gasoline odor was noted. Examination of the excavated UST pit revealed the presence of a black, viscous substance with a slight sulfurous odor at the southern end of the pit. The black substance was concentrated in a layer of ballast rock from about 30 to 50 inches below ground level. The black substance was also present in sample pit CUIS-5 at approximately the same depth interval (Photo 5). The black substance was thought to be diesel-fuel residue. The substance served as a marker for CUIS personnel to follow while removing contaminated soil.

CONTAMINATED SOIL REMOVAL

After both USTs were removed, efforts were initiated to remove the soil that was obviously contaminated by hydrocarbons. The existing UST pit was excavated to about a depth of about 8 feet below ground surface level. The excavation was then expanded to the north, south, and east directions for a distance of about 10 feet. A wooden deck, which serves as a congregating point for park visitors, prevented a full westward expansion of the excavation. The excavation then continued through sampling pit CUIS-5. The excavation was then narrowed to form a trough which was excavated to a depth of about 5 feet from CUIS-5 to the St. Marys River bank. The final limits of the excavated area is depicted in Figure 4.

ANALYTE CONCENTRATIONS IN WATER AND SOIL SAMPLES

A copy of the analytical report from CORE Laboratories is included in Appendix 2. The results from the water samples have been tabulated in Table 2, while soil Total Petroleum Hydrocarbon concentrations are displayed in Figure 4. The only water sample which contained indicators of hydrocarbon contamination was CUIS-6. This sample represented ground water that had collected in the excavation pit after a semidiurnal tide cycle, and was most likely affected by the spillage from the USTs during the removal operation. All other water samples were below the detection limits for TBEXs and TPHs.

Six soil samples displayed TPH concentrations above 100 mg/kg. The sample sites, sample depth, and respective TPH concentrations are: CUIS-1, 0"-12", 144 mg/kg; CUIS-2, 24"-36", 144 mg/kg; CUIS-5, 24"-36", 104 mg/kg; CUIS-5, 48"-60", 144 mg/kg; CUIS-6, 0"-12", 548 mg/kg; and CUIS-6, 12"-24", 104 mg/kg.

Photo 5. Zone of hydrocarbon contamination at about 30" below ground surface at the south end of the UST excavation pit. May 3, 1989

TABLE 2

Concentration of Analytes in Water
Cumberland Island National Seashore, Initial Site Characterization

		GROUND WATER			SURFACE WATER	DRINKING WATER
ANALYTICAL PARAMETERS	UNITS	CUIS-3	CUIS-5	CUIS-6	St Marys River	Outside tap
Total Petroleum Hydrocarbons	mg/1	<10	<10	20	<10	<10
Benzene	ug/1	<1	<1	123	<1	<1
Ethyl Benzene	ug/1	<5	<5	99	<5	<5
Toluene	ug/1	<5	<5	520	<5	<5
Xylenes	ug/1	<5	<5	201	<5	<5
TDS	mg/1	836		1840	35800	
EC	umhos/cm	1100		2200	40000	
Sodium	mg/1	350		530	11000	
Calcium	mg/1	108		116	374	
Chloride	mg/1	241		745	18400	
Sulfate	mg/1	117		35	2700	
Lead (total)	mg/1	<0.05		<0.05	<0.1	
pH	S.U	7.76		7.27	7.70	

CONCLUSIONS

UST LEAK CONFIRMATION

This investigation has confirmed that the CUIS gasoline and diesel USTs leaked from the numerous holes in both tanks, as evidenced by TPH concentrations in the surrounding soils and visual observations. The CUIS USTs were also responsible for the fuel that flowed into the St. Marys River through CUIS-4. The period of time that the USTs contributed hydrocarbon fuel contamination to the environment is uncertain, as is the total quantity of fuels that leaked from the USTs. The fuel leakage caused environmental damage to about 6 square yards of the intertidal vegetative zone on the banks of the St. Marys. However, vegetation is reestablishing itself at the fringes of the fuel emergence point. No evidence was found that any existing potable water supplies were contaminated by the fuel leakage.

REMOVAL OF CONTAMINATION BY ENVIRONMENTAL FACTORS

Because of the approximate 9 month period between the cessation of use of the USTs, and ultimate removal and site investigation, much of the original soil hydrocarbon contamination has probably been removed by natural processes and factors at the site. The most significant factors are probably the presence of well-drained sandy soils and the semi-diurnal fluctuations of the ground water table, by possibly as much as 8 feet, with the St. Marys River tide. The twice-daily flushing action of the ground water has probably removed many of the more water-soluble components of the fuels from the sandy soil. The highest concentration of TPHs, 548 mg/kg, was found in the first 12 inches below the USTs. This zone was probably affected by the spillage from the USTs during removal. The concentration of TPHs decreased with depth below the USTs. A sample collected at the bottom of the excavation, and about 36 inches below the USTs, revealed a TPH concentration of 80 mg/kg.

HYDROCARBON CONTAMINATION ABOVE THE BOTTOM OF THE USTs

The fuel emergence point and much of the remaining hydrocarbon contamination in the soil was above the bottom-most portion of the USTs and their leak causing holes. Examination of Figure 4 (profile view) reveals that the lowest most portions of the USTs were below the maximum high-tide water mark observed during this investigation. Assuming that the maximum ground-water table elevation approximately equaled the high-tide elevations of the St. Marys River and that many components of the diesel and gasoline fuels floated at the ground water-soil interface--the observed zone of soil contamination and the fuel emergence point are within the potential range of ground-water table fluctuations.

HYDROCARBON CONTAMINATION OUTSIDE OF THE SOIL REMOVAL AREA

Two soil samples (CUIS-1, 0"-12" and CUIS-2, 48"-60") which represent areas outside the final excavated area, displayed TPH concentrations above 100 mg/kg. There is no obvious explanation for the measured TPH concentration in the first 12-inch sample at

CUIS-1 except that this area was within the general access route for fuel deliveries to the CUIS USTs. The 144 mg/kg of TPH at CUIS-2 probably indicates that some hydrocarbon contamination remains east of the area that has been excavated.

STATE OF GEORGIA REVIEW AND APPROVAL

The Superintendent submitted the draft ISC to the GDNR, Underground Storage Tank Unit on August 2, 1989. In an August 23, 1989 letter (Appendix 3) to the Superintendent, GDNR concluded that the fuel release had little or no impact on surface or ground water. GDNR also concluded that this report satisfied the Federal UST regulations for tank closure, paragraph 280.72, for corrective action. As a result of these findings, the State does not intend to require remedial action at the CUIS UST site.

APPENDIX 1

Methodologies and Sample Container Requirements

METHODOLOGY/SAMPLE CONTAINER REQUIREMENTS

Parameter	Method Reference	Volume (mL)	Bottle Type	Preservative(5)
Acidity	305.1(1)	100	P,G	Cool,4C
Alkalinity	310.1(1)	100	P,G	Cool,4C
Coliform,total	(6)	125	G/Sterile	Na2S2O3,Cool,4C
Coliform,fecal	(6)	125	G/Sterile	Na2S2O3,Cool,4C
Std Plate Count	(6)	125	G/Sterile	Na2S2O3,Cool,4C
BOD-5 day	405.1(1)	1000	P,G	Cool,4C
Bromide	320.1(1)	500	P,G	Cool,4C
COD	410.1-410.4(1)	50	P,G	H2SO4,Cool,4C
Chloride	325.1-325.3(1)/9250-9252(2)	100	P,G	Cool,4C
Chlorine, Resid.	330.1-330.5(1)	250	P,G	Cool,4C
Color	110.2(1)	50	P,G	Cool,4C
Conductivity	120.1(1)/9050(2)	100	P,G	Cool,4C
Cyanide, total	335.2-335.3(1)/9010(2)	1000	P,G	NaOH,Cool,4C
Cyanide, ATC	335.1(1)/9010(2)	1000	P,G	NaOH,Cool,4C
Fluoride	340.1,340.3(1)	1000	P	Cool,4C
Fluoride, ISE	340.2(1)	300	P	Cool,4C
Hardness	130.2(1)	100	P,G	HNO3
Iodide	345.1(1)	500	P,G	Cool,4C
Nitrogen-Ammonia	350.1,350.3(1)	500	P,G	H2SO4,Cool,4C
N-Ammonia, dist.	350.2(1)	1000	P,G	H2SO4,Cool,4C
Nitrogen, TKN	351.1-351.4(1)	1000	P,G	H2SO4,Cool,4C
Nitrogen, Nitrate	352.1(1)/9200(2)	100	P,G	Cool,4C
N-Nitrate+Nitrite	353.1-353.3(1)	100	P,G	H2SO4,Cool,4C
Nitrogen-Nitrite	354.1(1)	100	P,G	Cool,4C
Odor	140.1(1)	1000(NHS)	G	Cool,4C
Carbon (all forms)	415.1(1)/9060(2)	50	G	H2SO4,Cool,4C
TOX	9020(2)	1000	G/Amber/TFE	Cool,4C
Diss. Oxygen	360.1-360.2(1)	500	G	Cool,4C
Oil & Grease	413.1(1)/9070-9071(2)	1000	G	H2SO4,Cool,4C
pH	150.1(1)/9040,9045(2)	100	P,G	Cool,4C
Phenols(4AAP)	420.1(1)/9065(2)	1000	G	H2SO4,Cool,4C
Phosphorus,ortho	365.1-365.4(1)	100	P,G	Cool,4C
Phosphorus,total	365.1-365.4(1)	100	P,G	H2SO4,Cool,4C
Solids, total	160.3(1)	250	P,G	Cool,4C
Solids, dissolved	160.1(1)	250	P,G	Cool,4C
Solids, suspended	160.2(1)	250	P,G	Cool,4C
Solids, volatile	160.4(1)	250	P,G	Cool,4C
Solids, settleable	160.5(1)	1000	P,G	Cool,4C
Solids, TVSS	160.2,160.4(1)	250	P,G	Cool,4C
Sulfate	375.2-375.4(1)/9036,9038(2)	200	P,G	Cool,4C
Sulfide	376.1-376.2(1)/9030(2)	250	P,G	ZnAc/NaOH,Cool,4C
Sulfite	377.1(1)	250	P,G	Cool,4C
Surfactants	425.1(1)	1000	P,G	Cool,4C
Turbidity	180.1(1)	100	P,G	Cool,4C

METHODOLOGY/SAMPLE CONTAINER REQUIREMENTS

Parameter	Method Reference	Volume (mL)	Bottle Type	Preservative(5)
Aluminum (Al)				
Flame	202.1(1)/7020(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	202.2(1)	20	P,G	HNO3
Antimony (Sb)				
Flame	204.1(1)/7040(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	204.2(1)/7041(2)	20	P,G	HNO3
Arsenic (As)				
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	206.2(1)/7060(2)	20	P,G	HNO3
Hydride	206.3(1)/7061(2)	50	P,G	HNO3
Barium (Ba)				
Flame	208.1(1)/7080(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	208.2(1)	20	P,G	HNO3
Beryllium (Be)				
Flame	210.1(1)/7090(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	210.1(1)/7091(2)	20	P,G	HNO3
Boron (B)				
Colorimetric	212.3(1)	50	P	Cool,4C
ICP	200.7(1)/6010(2)	20	P	Cool,4C
Cadmium (Cd)				
Flame	213.1(1)/7130(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	213.2(1)/7131(2)	20	P,G	HNO3
Calcium (Ca)				
Flame	215.1(1)/7140(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Chromium (Cr)				
Flame	218.1(1)/7190(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	218.2(1)/7191(2)	20	P,G	HNO3
Hexavalent	218.5(1)/7196(2)	250	P,G	Cool,4C
Cobalt (Co)				
Flame	219.1(1)/7200(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	219.2(1)/7201(2)	20	P,G	HNO3
Copper (Cu)				
Flame	220.1(1)/7210(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	220.2(1)	20	P,G	HNO3

METHODOLOGY/SAMPLE CONTAINER REQUIREMENTS

Parameter	Method Reference	Volume (mL)	Bottle Type	Preservative(5)
Iron (Fe)				
Flame	236.1(1)/7380(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	236.2(1)	20	P,G	HNO3
Ferric/Ferrous	315-B(3)	100	P,G	HCl,Cool,4C
Lead (Pb)				
Flame	239.1(1)/7420(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	239.2(1)/7421(2)	20	P,G	HNO3
Lithium (Li)				
Flame	303-A(3)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Magnesium (Mg)				
Flame	242.1(1)/7450(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Manganese (Mn)				
Flame	243.1(1)/7460(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	243.2(1)	20	P,G	HNO3
Mercury (Hg)				
Cold Vapor	245.1,245.5(1)/7470-7471(2)	100	P,G	HNO3
Molybdenum (Mo)				
Flame	246.1(1)/7480(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	246.2(1)/7481(2)	20	P,G	HNO3
Nickel (Ni)				
Flame	249.1(1)/7520(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	249.2(1)	20	P,G	HNO3
Potassium (K)				
Flame	258.1(1)/7610(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Selenium (Se)				
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	270.2(1)/7740(2)	20	P,G	HNO3
Hydride	270.3(1)/7741(2)	50	P,G	HNO3
Silicon (Si)				
Flame	303-C(3)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Silver (Ag)				
Flame	272.1(1)/7760(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	272.2(1)	20	P,G	HNO3

METHODOLOGY/SAMPLE CONTAINER REQUIREMENTS

Parameter	Method Reference	Volume (mL)	Bottle Type	Preservative(5)
Sodium (Na)				
Flame	273.1(1)/7770(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	273.2(1)	20	P,G	HNO3
Strontium (Sr)				
Flame	303-A(3)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Thallium (Tl)				
Flame	279.1(1)/7840(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	279.2(1)/7841(2)	20	P,G	HNO3
Tin (Sn)				
Flame	282.1(1)/7870(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	282.2(1)	20	P,G	HNO3
Titanium (Ti)				
Flame	283.1(1)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	283.2(1)	20	P,G	HNO3
Uranium (U3O8)				
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Fluorometric	908.1(4)	100	P,G	HNO3
Vanadium (V)				
Flame	286.1(1)/7910(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	286.2(1)/7911(2)	20	P,G	HNO3
Zinc (Zn)				
Flame	289.1(1)/7950(2)	20	P,G	HNO3
ICP	200.7(1)/6010(2)	20	P,G	HNO3
Furnace	289.2(1)	20	P,G	HNO3
Gross Alpha/Beta	900.0(4)	250	P,G	HNO3
Total Radium	900.1(4)	1000	P,G	HNO3
Radium 226	903.1(4)	1000	P,G	HNO3
Radium 228	904.0(4)	1000	P,G	HNO3
Ignitability	1010(2)	100	P,G	Cool,4C
Corrosivity	1110(2)	100	P,G	Cool,4C
Reactivity	7.3(2)	500	P,G	Cool,4C
EP Toxicity	1310(2)	1000	P,G	Cool,4C
Purg. Halocarbons	601(5)/8010(2)	40(NHS)	G/TFE	Cool,4C
Purg. Aromatics	602(5)/8020(2)	40(NHS)	G/TFE	HCl,Cool,4C
Acrolein/Acrylonitrile	603(5)/8030(2)	40(NHS)	G/TFE	Cool,4C
Phenols	604(5)/8040(2)	1000	G/Amber/TFE	Cool,4C
Benzidines	605(5)	1000	G/Amber/TFE	Cool,4C
Phthalate Esters	606(5)/8060(2)	1000	G/Amber/TFE	Cool,4C
Nitrosamines	607(5)	1000	G/Amber/TFE	Cool,4C
Pesticides/PCB's	608(5)/8080(2)	1000	G/Amber/TFE	Cool,4C

METHODOLOGY/SAMPLE CONTAINER REQUIREMENTS

Parameter	Method Reference	Volume (mL)	Bottle Type	Preservative(5)
Nitroaromatics	609(5)/8090(2)	1000	G/Amber/TFE	Cool,4C
Polynuclear Aromatics	610(5)/8100(2)	1000	G/Amber/TFE	Cool,4C
Haloethers	611(5)	1000	G/Amber/TFE	Cool,4C
Chlorinated HC	612(5)/8120(2)	1000	G/Amber/TFE	Cool,4C
Dioxin	613(5)/8280(2)	1000	G/Amber/TFE	Cool,4C
Volatiles	624(5)/8240(2)	40(NHS)	G/TFE	HCl,Cool,4C
Semi-Volatiles	625(5)/8270(2)	2000	G/Amber/TFE	Cool,4C
Pesticides/PCB's	608(5)/8080(2)	1000	G/Amber/TFE	Cool,4C
BTX/BETX	602,624(5)/8020,8240(2)	40(NHS)	G/TFE	HCl,Cool,4C
Trihalomethanes	601(5)/8010(2)	40(NHS)	G/TFE	Cool,4C
EPA VOC's	EPA 524	3X40(NHS)	G/TFE	HCl,Cool,4C

References:

1) EPA-600/4-79-020, Methods for the Analysis of Water and Wastes, March 1983.

2) EPA-SW-846, Test Methods for Evaluating Solid Waste, Third Edition, Nov 1986.

3) APHA, Standard Methods for the Examination of Water and Wastewater, 16th Ed, 1985.

4) EPA-600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, August 1980.

5) Federal Register, Friday, October 26, 1984 (40 CFR Part 136).

6) EPA-600/8-78-017, Microbiological Methods for Monitoring the Environment, Dec 1978.

NOTE TO APPENDIX 2

The Analytical Report within this Appendix represents an amended report submitted by CORE laboratories at the request of the National Park Service (NPS). The first analytical report was submitted to the NPS on June 15, 1989. The amended report was requested to clarify analytical reporting units and the actual laboratory test method. No amendments were made to the original parameter concentrations that were reported in the June 15 report.

APPENDIX 2

Analytical Report, Soil and Water Samples

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CORE LABORATORIES

AMENDED REPORT

A N A L Y T I C A L R E P O R T

890586

FOR

NATIONAL PARK SERVICE

FEDERAL BLDG., ROOM 335
FT. COLLINS, CO 80521

07/20/89

Western Atlas International
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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 - CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0001 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:14:05

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-1-0"-12" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	144	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: [signature]

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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN: -

SAMPLE NUMBER:0002 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:14:32

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-1-24"-36" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	<20	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: [signature]

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LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0003 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:14:52

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-1-48'-60' REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	<20	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: Rhonda Tedder

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LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0004 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:15:19

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-1-72"-84" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	64	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: Tracie Tabor

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07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0005 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:16:00

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-1-84"-96" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	<20	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: Kevin Tolson

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LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0006 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:17:00

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-2-24"-36" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	144	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: Kevin Tasson

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07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE - ATTN:

SAMPLE NUMBER:0007 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:17:00

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-2-48"-60" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	<20	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: Kevin Lassen

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LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0008 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/02/89 SAMPLE TIME:19:20

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-3 REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Chloride (Filt.)	241	mg/L	EPA 325.2	05/18/89	PJM
pH (Filt.)	7.76	pH Units	EPA 150.1	05/30/89	JLS
Solids, Total Dissolved (TDS)	836	mg/L	EPA 160.1	05/10/89	RMN
Sulfate (Filt.)	117	mg/L	EPA 375.2	05/30/89	PJM
Calcium, Diss. (Ca)	108	mg/L	EPA 200.7/6010	05/25/89	WGL
Lead, Total (Pb)	<0.05	mg/L	EPA 200.7/6010	05/23/89	TLK
Sodium, Diss. (Na)	350	mg/L	EPA 200.7/6010	05/25/89	WGL
Benzene	<1	ug/L	EPA 624/8240	05/19/89	PD
Ethyl Benzene	<5	ug/L	EPA 624/8240	05/19/89	PD
Toluene	<5	ug/L	EPA 624/8240	05/19/89	PD
Total Petroleum Hydrocarbons	<10	mg/L	EPA 418.1	05/16/89	JL
Xylenes	<5	ug/L	EPA 8240	05/19/89	PD

APPROVED BY: _____

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07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN: -

SAMPLE NUMBER:0009 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/03/89 SAMPLE TIME:17:21

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-4-0"-12" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	80	mg/Kg	EPA 418.1	05/16/89	JL

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07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0010 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/04/89 SAMPLE TIME:19:20

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CUIS-5 MIDWAY PIT REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Benzene	<1	ug/L	EPA 624/8240	05/19/89	PD
Ethyl Benzene	<5	ug/L	EPA 624/8240	05/19/89	PD
Toluene	<5	ug/L	EPA 624/8240	05/19/89	PD
Total Petroleum Hydrocarbons	<10	mg/L	EPA 418.1	05/16/89	JL
Xylenes	<5	ug/L	EPA 8240	05/19/89	PD

APPROVED BY: Kevin Tasseo

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LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0011 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/03/89 SAMPLE TIME:10:53

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID: CUIS-5 24"-36" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	104	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: Kevin Lathan

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JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0012 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/03/89 SAMPLE TIME:11:07

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID: CUIS-5 48"-60" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	144	mg/Kg	EPA 418.1	05/16/89	JL

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JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0013 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/03/89 SAMPLE TIME:16:00

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID: CUIS-6 VST EXCAVATION PIT REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Chloride (Filt.)	745	mg/L	EPA 325.2	05/18/89	PJM
pH (Filt.)	7.27	pH Units	EPA 150.1	05/30/89	JLS
Solids, Total Dissolved (TDS)	1840	mg/L	EPA 160.1	05/10/89	RMN
Sulfate (Filt.)	35	mg/L	EPA 375.2	05/30/89	PJM
Calcium, Diss. (Ca)	116	mg/L	EPA 200.7/6010	05/25/89	WGL
Lead, Total (Pb)	<0.05	mg/L	EPA 200.7/6010	05/23/89	TLK
Sodium, Diss. (Na)	530	mg/L	EPA 200.7/6010	05/25/89	WGL
Benzene	123	ug/L	EPA 624/8240	05/19/89	PD
Ethyl Benzene	99	ug/L	EPA 624/8240	05/19/89	PD
Toluene	520	ug/L	EPA 624/8240	05/19/89	PD
Total Petroleum Hydrocarbons	20	mg/L	EPA 418.1	05/16/89	JL
Xylenes	201	ug/L	EPA 8240	05/19/89	PD

APPROVED BY: Kevin Tolson

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LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0014 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/03/89 SAMPLE TIME:16:00

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID: CUIS-6 0"-12" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	548	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: [signature]

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LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0015 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/03/89 SAMPLE TIME:10:01

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID: CUIS-6 12"-24" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	104	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: Kevin Lanahan

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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0016 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/03/89 SAMPLE TIME:17:41

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:SM-1 REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Chloride (Filt.)	18400	mg/L	EPA 325.3	05/23/89	PJM
pH (Filt.)	7.70	pH Units	EPA 150.1	05/30/89	JLS
Solids, Total Dissolved (TDS)	35800	mg/L	EPA 160.1	05/10/89	RMN
Sulfate (Filt.)	2700	mg/L	EPA 375.3	05/19/89	EJN
Calcium, Diss. (Ca)	374	mg/L	EPA 200.7/6010	05/25/89	WGL
Lead, Total (Pb)	<0.1	mg/L	EPA 200.7/6010	05/23/89	TLK
Sodium, Diss. (Na)	11000	mg/L	EPA 200.7/6010	05/25/89	WGL
Benzene	<1	ug/L	EPA 624/8240	05/19/89	PD
Ethyl Benzene	<5	ug/L	EPA 624/8240	05/19/89	PD
Toluene	<5	ug/L	EPA 624/8240	05/19/89	PD
Total Petroleum Hydrocarbons	<10	mg/L	EPA 418.1	05/16/89	JL
Xylenes	<5	ug/L	EPA 8240	05/19/89	PD

APPROVED BY: Kevin Larsen

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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0017 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/04/89 SAMPLE TIME:12:37

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CVIS-DW REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Benzene	<1	ug/L	EPA 624/8240	05/19/89	PD
Ethyl Benzene	<5	ug/L	EPA 624/8240	05/19/89	PD
Toluene	<5	ug/L	EPA 624/8240	05/19/89	PD
Total Petroleum Hydrocarbons	<10	mg/L	EPA 418.1	05/16/89	JL
Xylenes	<5	ug/L	EPA 8240	05/19/89	PD

APPROVED BY: Kevin Labadie

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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890586 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0018 DATE RECEIVED:05/08/89 TIME RECEIVED:08:00 SAMPLE DATE:05/04/89 SAMPLE TIME:14:15

PROJECT ID:CUMBERLAND NATIONAL SEASHORE SAMPLE ID:CVIS-NORTH WALL 48"-64" REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	<20	mg/Kg	EPA 418.1	05/16/89	JL

APPROVED BY: _____

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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890645 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0001 DATE RECEIVED:05/24/89 TIME RECEIVED:09:00 SAMPLE DATE:05/06/89 SAMPLE TIME:09:50

PROJECT ID:CUMBERLAND ISLAND N.S. SAMPLE ID:CUIS2-1 5' REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	12	mg/Kg	EPA 418.1	06/05/89	JL

APPROVED BY: [signature]

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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890645 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0002 DATE RECEIVED:05/24/89 TIME RECEIVED:09:00 SAMPLE DATE:05/06/89 SAMPLE TIME:09:50

PROJECT ID:CUMBERLAND ISLAND N.S. SAMPLE ID:CUIS2 2 4'-6' REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	80	mg/Kg	EPA 418.1	06/05/89	JL

APPROVED BY: Terri Larson

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CORE LABORATORIES

LABORATORY TESTS RESULTS
07/20/89

JOB NUMBER: 890645 CUSTOMER: NATIONAL PARK SERVICE ATTN:

SAMPLE NUMBER:0003 DATE RECEIVED:05/24/89 TIME RECEIVED:09:00 SAMPLE DATE:05/06/89 SAMPLE TIME:09:50

PROJECT ID:CUMBERLAND ISLAND N.S. SAMPLE ID:CUIS2-3 4' REM:

TEST DESCRIPTION	FINAL TEST RESULT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Total Petroleum Hydrocarbons	16	mg/Kg	EPA 418.1	06/05/89	JL

APPROVED BY: Kevin Jackson

1300 S. Potomac St., Suite 130
Denver, CO 80012
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APPENDIX 3

Letter From the Georgia Department of Natural Resources
Approving the Draft ISC

REPLY TO:

INDUSTRIAL WASTE MANAGEMENT PROGRAM
UNDERGROUND STORAGE TANK UNIT
3420 NORMAN BERRY DRIVE
7TH FLOOR
HAPEVILLE, GEORGIA 30354
(404)669-3927

Georgia Department of Natural Resources
205 Butler Street, S.E., Floyd Towers East, Atlanta, Georgia 30334
J. Leonard Ledbetter, Commissioner
Harold F. Reheis, Assistant Director
Environmental Protection Division

August 23, 1989

Superintendent K.O. Morgan
Cumberland Island National Seashore
National Park Service
P.O. Box 806
St. Marys, Georgia 31558

SUBJECT: Underground Storage Tank (UST) Release:
Cumberland Island National Seashore,
National Park Service
St. Marys, GA; Camden County

Dear Superintendent Morgan:

This is in reply to your letter, dated August 2, 1989, to David Muntz of my staff that forwarded the tank closure assessment and initial site characterization report for the subject release. This report satisfies the federal UST regulations for tank closure, paragraph 280.72, as well as the initial site characterization requirement, paragraph 280.63, for corrective action.

The analytical data presented in your report confirm that the bulk of contaminated soil was removed successfully at the time of tank closure. The twice-daily flushing action by tidal controlled groundwater has probably already removed the documented residual soil contamination; consequently, additional soil remediation is unwarranted.

The release had little or no impact on surface waters, or groundwater, as your sampling and analytical data confirm. For this reason, the Georgia Environmental Protection Division (EPD) does not intend to require further remedial action at this site.

If you have any questions, please contact David C. Muntz, P.E., at (404)669-3927.

Sincerely,

Marlin R. Gottschalk

Marlin R. Gottschalk, Ph.D.
Unit Coordinator
Underground Storage Tank Unit

MRG:dmm:6/21
cc: Gary Rosenlieb, National Park Service
Randolph D. Williams, GA EPD
David C. Muntz, GA EPD
File: Camden; St. Marys; National Park Service; Cumberland Island National Seashore

REFERENCES

Georgia Department of Natural Resources. Undated. State of Georgia Water Use Classifications and Water Quality Standards.

Georgia Marine Science Center, University System of Georgia, Skidaway Island, Georgia. 1975. The Ecology of the Cumberland Island National Seashore, Camden County Georgia. Technical Report Series Number 75-5.

United States Geological Survey. 1985. Sediment Sources and Transport in Kings Bay and Vicinity, Georgia and Florida, July 8-16, 1982. U.S.G.S. Professional Paper 1347.

The National Park Service Water Resources Division is responsible for providing water resources management policy and guidelines, planning, technical assistance, applied research, training and operational support to units of the National Park Service. Program areas include water rights, water resources planning, regulatory guidance and review, hydrology, water quality, watershed management, watershed studies and aquatic ecology.

Copies of this report are available from the following:

Computer Assistant (303) 221-8330
National Park Service
Water Resources Division
301 S. Howes Street
Fort Collins, CO 80521

Technical Information Center (303) 969-2130
Denver Service Center
P.O. Box 25287
Denver, CO 80225-0287

As the nation's principal conservation agency, the Department of the Interior has the responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The mission of the Water Resources Division is to preserve and protect National Park Service water resources and water dependent environments. This mission is accomplished through a watershed management program based on needs at the park, Region, and National levels.

NPS D-46 October 1990